A very clear idea of the differences in density which are caused by great differences in temperature may be obtained by a consideration of the air (gases) in an open-hearth furnace, of which the temperature is in the neighborhood of 1638° while that of the air is 0°. If it is assumed that the density of the gases in the furnace is equal to water, the density of the air at 0° will be relatively equal to that of molten iron.

A furnace in its regular working condition may be considered as being immersed in a glass tank filled with water, the heavy liquid, while the interior of the furnace is traversed by a lighter liquid; the action of the flame within the furnace may in this manner be considered as similar to that of the lighter liquid flowing within the heavier liquid.

A complete representation of the circulation of the flame or hot gases within a furnace may be made in the following manner;

A model to scale of the longitudinal section of a reverberatory furnace is constructed and immersed in a tank with glass sides; if a stream of a lighter liquid, as for instance, kerosene, is now passed through the model of the furnace, the movement of this liquid will reproduce exactly the movement of the flames within the furnace.

II. EXPERIMENTS WHICH SERVE TO SHOW THE ANALOGY BETWEEN THE CIRCULATION OF THE FLAME AND THE MOVEMENTS OF A LIGHT LIQUID WITHIN A HEAVY LIQUID.[1]

A white metal model reproducing to scale a brick kiln is placed between two sheets of glass and submerged in a glass tank; by means of pipes a stream of colored kerosene is passed into the model^ through the firebox from which the gases of combustion enter the furnace.

[1] The photographs for Figs. 1, 2, 4, 10, 19, 24, 29, 30; 31,32,116, and 117 were supplied by the *Sotiet6 russe de metallurgie,* whom the author desires to

thank for the same.

(2) The illustration (Fig. 2) shows the general arrangement of the apparatus which has been used in conducting the experiments made before the classes at the Polytechnic Institute of Petrograd. The model is a scale reproduction of a brick kiln of the Motovillikha works, the drawing of which is shown in Fig. 3. This is submerged in a tank filled with water. Tubes with control valves serve to introduce streams of colored kerosene through the fireboxes of the kiln, the kerosene flowing from a large bottle which acts as a high-level reservoir. The kerosene, having passed through the furnace, rises to